The zero leverage phenomenon in European listed firms: a financing decision or an imposition of the financial market?

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Abstract

This paper seeks to provide empirical evidence on the phenomenon of zero leverage for a sample of European listed firms. The data were collected from the Datastream database for the period 1995-2016. It is shown that there are two types of firms with zero leverage: the financially constrained firms that face obstacles in obtaining external finance, supporting the financial constraints hypothesis; and financially unconstrained firms that maintain zero leverage as a consequence of a financing decision, which supports the financial flexibility explanation of zero leverage. The zero leverage phenomenon is influenced by the financial system that prevails in the country, being boosted (inhibited) in market-based (bank-based) financial systems. The recent financial and sovereign debt crises have had a positive impact on zero leverage of European listed firms.

Key-words: Zero leverage; Capital Structure; Financial Constraints; Financial Flexibility; Financial System

1- Introduction

Firms such as Apple, Amazon and Yahoo are examples of organisations that in a given period have adopted extremely conservative levels of debt, even reaching an unexpected zero leverage level[1] (Bessler, Drobetz, Haller, & Meier, 2013; Byoun & Xu, 2013). Recently, a new line of research in corporate finance found that an important proportion of firms present zero leverage levels, which has become a phenomenon known as "mysterious zero leverage", after the contemporary study of Strebulaev and Yang (2013). More intriguing is the fact that some academics claim that this is an increasing and global phenomenon (Bessler et al., 2013; Ghoul, Guedhami, Kwok, & Zheng, 2018), which has not yet been responded by the scientific community due to the lack of underlying theoretical support.

The complexity of the zero leverage phenomenon increases inasmuch as the dominant theories of capital structure are not able to explain such conservative levels of debt. According to the Trade-off and Agency theories, firms should use debt to obtain debt-tax shields as well to reduce agency conflicts (see Frank & Goyal, 2008). Moreover, in accordance with the predictions of Pecking Order theory, firms should rely on debt after the exhaustion of internal finance and before equity issues, in order to minimize the financing costs.

The lack of theoretical support has led academics to present alternative approaches to explain zero leverage, namely the financial constraints hypothesis (Bessler et al., 2013; Huang, Li, & Gao, 2017), financial flexibility approach (Dang, 2013; Huang et al., 2017), managerial entrenchment and corporate governance (Devos, Dhillon, Jagannathan, & Krishnamurthy, 2012; Strebulaev & Yang, 2013) and the macroeconomic effect (Dang, 2013; Ghose & Kabra, 2016). However, despite using similar samples in some cases, the empirical evidence of those studies is not conclusive, and, in fact, it is somewhat conflicting (Byoun & Xu, 2013; Devos et al., 2012; Strebulaev & Yang, 2013), hindering the clarification of the zero leverage phenomenon. All these studies only agree on the existence of a significant number of debt-free firms and a trend for the increasing of the phenomenon over the years.

Specifically, Ramalho and Silva (2009) revealed that a high proportion (72.8%) of firms in their sample had no long-term debt. However, the zero leverage phenomenon is not confined to the lack of long-term debt, but also refers to zero short-term debt. In this context, Strebulaev and Yang (2013) showed that between 1962 and 2009, an average of 10.2%[2] of large listed US firms follow a zero leverage policy. The rising trend of the phenomenon is demonstrated by D'Mello

[1]See for instance the annual financial report of the firms highlighted. To access a higher number of firms with zero-debt, consult the news presented at https://www.cnbc.com/2012/01/25/15-Companies-with-Zero-Debt.html, showing 15 debt-free firms in the S&P 500.

[2]Strebulaev and Yang (2013) present evidence that around 61% of firms with zero leverage continue leverage-free in the following year.

and Gruskin (2014), showing that in 1980 the percentage of zero leverage US firms was around 6%, increasing to more than 19% in 2010. Using a similar sample, Devos et al. (2012) identified persistence of the zero leverage phenomenon, concluding that 11.3% of the firms of the sample had no debt during three consecutive years. Also, Byoun and Xu (2013) conclude that US listed firms reduce their level of debt until the year they become debt-free. Despite some concentration of the phenomenon in certain industries[3], the studies presented above report that debt-free firms are found in most industries (Byoun & Xu, 2013; Strebulaev & Yang, 2013). Using a sample of listed non-financial firms in the UK, Dang (2013) shows that the proportion of zero leverage firms is substantially higher in the UK than in the US. With international samples, Bessler et al. (2013) conclude that the trend towards zero leverage is greater in countries with a common law system (about 27% of firms have zero leverage) than in countries with civil law system (about 10% of firms have zero leverage). Additionally, Ghoul et al. (2018) conclude that the zero leverage phenomenon is more pronounced in developed and high-income countries.

Takami (2016), for a sample of Japanese listed firms, presents evidence that, on average, only 5.7% of firms have zero leverage, which is significantly less than the percentage revealed by Bessler et al. (2013) for either countries with a common law system or those countries with a civil law system. With Japan being a country with a civil legal system (Djankov, McLiesh, & Shleifer, 2007), and, simultaneously, with great predominance of a banking system (Antoniou, Guney, & Paudyal, 2008), the results obtained by Takami (2016) suggest that the zero leverage phenomenon depends on the financial system prevailing in the country. It is worthly to refer that the majority of studies focusing on this subject used samples of firms in countries with a market-based financial system (essentially US), which favours to rise capital from the capital market rather than banks (La Porta, Lopez-de-Silanes, Shleifer, & Vishny, 1997; 1998). So far no study has analysed the phenomenon exclusively in the European listed firms context. Consequently, it remains to individualize a sample of European firms, where a bank-based financial system predominates (Demirgüç-Kunt & Levine, 2004; La Porta et al., 1998), in order to confirm the generalization of zero leverage in these countries.

In an attempt to fill the previous gap, this study focuses on two important and unexplored research questions: *Is the increasing phenomenon of zero leverage observable in European countries with different financial systems?* and *Does zero leverage in the European context result from financial constraints felt by firms or does it result from the desire of maintaining financial flexibility?* To answer to these questions, this paper seeks to provide empirical evidence on the zero leverage phenomenon in the context of European listed firms. Specifically, the paper's purpose is to resort

[3]The evidence gathered shows that the sectors most likely to have zero leverage are technology, health care services, business services and legal services (Bessler et al., 2013; Byoun & Xu, 2013; Strebulaev & Yang, 2013), which shows particular incidence in industries with fewer physical assets (Ghose & Kabra, 2016).

to a set of variables representing the financial constraints and financial flexibility approaches, in order to examine whether the zero leverage is explained by both approaches. Given that firms in countries with a common law system, which potentiates a market-based financial system (Demirgüç-Kunt & Levine, 1999), follow often a zero leverage policy, in the current study we intend to verify if firms in countries with a bank-based financial system (Langfield & Pagano, 2016; Mc Namara, Murro, & O'Donohoe, 2017) tend also to present zero leverage in their capital structures. Therefore, carrying out this study is fundamental to increase our understanding of the zero leverage phenomenon.

This study differs from previous studies that use samples where a market-based financial system predominates, being more challenging if we consider that Europe is the home of the largest banking system, where non-financial firms are more dependent on bank loans as the primary source of external finance (European Investment Bank, 2015). Another aspect differentiating this study from others, on this topic, is the period of analysis that covers the recent financial crisis (starting in 2008). In various countries, the recent financial crisis have been related to sovereign debt crises that until very recently prevented the normal economic growth, the availability of finance and the recovery of investment levels (European Commission, 2014; European Investment Bank, 2015).

This paper brings various contributions for the zero leverage research field. First, considering financial constraints and financial flexibility as possible perspectives for explaining zero leverage in European firms, in this study two types of zero leverage firms are identified. There is a group of debt-free firms that pay dividends and are more profitable and present greater levels of cash holdings and growth opportunities than leveraged firms. The other group refers to debt-free firms that do not pay dividends and that are smaller, display a lower level of tangible assets and on average exhibit negative levels of profitability. The reasons for zero leverage differ between the two groups of firms: i) the group formed by dividend-paying firms emerge as being in good financial health, highly profitable and provide signals of adopting conservative levels of debt through their own financing decisions, supporting the financial flexibility approach; ii) while the group of firms that do not pay dividends present a weaker financial situation, indicating that their zero leverage is essentially explained by the difficulties in obtaining debt, which is in accordance with the explanations of the financial constraints approach. In general, the results allow to conclude that European listed firms with zero leverage are mostly financially constrained.

Second, this study stands out from others by analysing the effect of the financial system on zero leverage, with empirical evidence revealing that the financial system prevailing in a country is a determinant of the zero leverage phenomenon. Third, it is shown that the recent financial and sovereign debt crises had a positive impact on zero leverage in European firms.

Summarising, the current study suggests that no single approach is able to explain the zero leverage phenomenon. It is concluded that zero leverage in the European listed firms is motivated by the arguments of the financial constraints approach (particularly in firms with lower levels of profitability and with signs of financial constraints), by the financial flexibility approach (particularly in firms with greater levels of profitability) as well as by the specific effects of the country and macroeconomic conditions.

The remainder of the paper is organised as follows. In Section 2, a brief theoretical framework of the approaches that try to explain the zero leverage phenomenon will be presented. Section 3 describes the data and the methodology used in the empirical analysis. Section 4 presents and discusses the results obtained by both univariate and multivariate analyses of the data. Finally, section 5 contains some final considerations.

2- Literature review and research hypotheses

Studies on the "low leverage phenomenon*"* (Minton & Wruck, 2001) and contemporary studies on the "zero leverage phenomenon" (Bessler et al., 2013; Dang, 2013) needed to resort to alternative explanatory approaches to the main financial theories. This study seeks to understand whether zero leverage is a consequence of market frictions or represents a financing decision of the European listed firms. Therefore, in the following we present some possible theoretical explanations of zero leverage. For each approach, a set of explanatory variables is presented, which will be used later to test the effect of each perspective on zero leverage.

2.1- Financial constraints approach

The financial constraints approach is the hypothesis most widely accepted by researchers as an explanation of the zero leverage phenomenon. In accordance with that approach, the zero leverage phenomenon is more an imposition due to financial market imperfections than to the firm's financing decision. Stiglitz and Weiss (1981) developed a theoretical model which shows that, in the presence of market frictions such as information asymmetries, debt can become too expensive. This prevents to fund projects with a positive net present value (NPV) through external finance, which may force the firms to forego good investment opportunities (Almeida & Campello, 2007). Indeed, financially constrained firms face restrictions in accessing to credit because lenders are not able to assess the quality of the firm´s future investments due to information asymmetries (Stiglitz & Weiss, 1981). Furthermore, Diamond (1991) states that, in the presence of adverse

selection and moral hazard problems, external finance becomes more difficult for firms with little reputation, i.e., firms without a favourable past in the credit market.

In accordance with the financial constraints approach, in the presence of capital market imperfections, one of the assumptions that must be considered is that capital structure is not exclusively determined by the need for capital (i.e., the demand side), but also by the possibility to obtain external finance (i.e., the supply side). In this context, Faulkender and Petersen (2006) showed that firms with access to the public debt market (those with a credit rating) use more debt than those without that access. Bessler et al. (2013) and Devos et al. (2012) find strong evidence that zero leverage firms are financially constrained[4]. More recently, Huang et al. (2017) show that firms that face more frequently financial constraints are more likely to present zero leverage.

Various measures of financial constraints have been used in the literature, in particular firm size (Cleary, 2006; Guariglia, 2008; Hadlock & Pierce, 2010) and dividend payments (Cleary, 2006; Fazzari, Hubbard, & Petersen, 1988). The measures highlighted can be seen as proxies for the degree to which firms are more exposed to information asymmetries, representing the difficulty in obtaining external finance (Guariglia, 2008). Specifically, firms of smaller size and firms that do not pay out dividends have less reputation, which makes it difficult to obtain external finance, inasmuch as lenders require greater compensation for the risk in granting credit to firms without reputation. Consequently, these firms are expected to be more prone to present zero leverage. Considering the previous studies focusing on topics related to conservative levels of debt (e.g. Dang, 2013; Ferrão, Curto, & Gama, 2016) as well as the current study's objectives, we will analyse the effect of size and dividend payout on zero leverage, in order to validate the financial constraints approach. Thus, the following hypotheses will be tested:

H1: Financial constraints increase the firm's likelihood of having zero leverage.

- H1a: Size has a negative effect on a firm's likelihood of having zero leverage;
- H1b: The payment of dividends has a negative effect on a firm's likelihood of having zero leverage.

2.2- The financial flexibility approach

The financial flexibility approach suggests that firms avoid debt as a consequence of their financing decisions and not of the inability to obtain external finance. The literature relates financial flexibility to firm's capacity to fund future investments, even in the presence of

[4]The authors conclude these are smaller firms with lower asset tangibility, which have not yet acquired a favourable reputation in the debt market.

information asymmetry (Ferrando, Marchica, & Mura, 2017; Gamba & Triantis, 2008). It is considered that the capacity to answer opportunely to unexpected changes in the firm's activity, particularly, in the context of investment opportunities, is improved by firm's financial flexibility (Denis, 2011). Recognizing the interdependence over time between the firm's financing and investment decisions is the starting point for enhancing the importance of financial flexibility.

The results of Graham and Harvey (2001), Bancel and Mittoo (2004) and Brounen, de Jong and Koedijk (2006) show that financial managers consider financial flexibility as a determinant factor of firm's capital structure decisions. In fact, firms can pursue the objective to preserve financial flexibility, presenting zero leverage levels. This idea is confirmed by the survey performed by Campello, Graham and Harvey (2010), where financial managers indicated that they voluntarily limit credit lines to maintain firm's debt capacity to turn to credit in the future as well as to keep a good reputation in the eyes of banks and capital market. The model developed by Almeida, Campelo and Weisbach (2011) forecast that financing constraints can imply to foregoing future good investment opportunities. Consequently, firms have incentive to increase their current level of liquid assets as well as to keep debt capacity, minimizing potential financial restrictions. Financial flexibility allows firms to mitigate either the underinvestment problem in situations of restricted access to external finance or the financial distress costs (Rapp, Schmid, & Urban, 2014).

In particular, Myers and Majluf (1984) suggest that information asymmetry between managers and creditors/investors make external funding too expensive. Firms should create financial slack by accumulating cash holdings (Myers, 1984), avoiding the need to rely on external finance. Given that high levels of debt decrease the future firm's debt capacity (Denis & McKeon, 2012), firms choose zero leverage, presenting high levels of cash holdings (Rapp et al., 2014) and preserving the firm's borrowing capacity (de Jong, Verbeek, & Verwijmeren, 2012). Marchica and Mura (2010) conclude that firms with low levels of debt try to maintain their financial flexibility through a low level of investment and turning to debt when good investment opportunities arise.

Recently, studies analysing the zero leverage phenomenon found evidence that supports the role of financial flexibility as a possible determinant of zero leverage. Bessler et al. (2013) present evidence that a low number of debt-free firms deliberately adopt a debt conservatism policy, i.e., zero leverage level. The authors conclude that debt-free firms have greater level of cash holdings than leveraged firms in an attempt of the former to increase the financial flexibility. Dang (2013) states that firms with greater levels of growth opportunities and liquidity are more likely to avoid debt, this being explained by the search for financial flexibility. The author concludes that the strategic decision to hold zero leverage prevails essentially in firms without financial constraints. Finally, Huang et al. (2017) show that firms with greater level of financial flexibility, represented

by unused debt capacity, are more likely to have zero leverage. In accordance with the financial flexibility approach, the firm accumulates internal liquidity to create financial slack, preserving the debt capacity for funding future growth opportunities (Myers, 1984).

In the literature, there is no well-defined measure of financial flexibility, this being a non-observable factor that depends greatly on managers' assessment of future growth opportunities (Ferrando et al., 2017). Nevertheless, the previous studies assess financial flexibility by resorting mostly to measures related to debt and/or cash holdings (Ang & Smedema, 2011; Arslan-Ayaydin, Florackis, & Ozkan, 2014 DeAngelo, DeAngelo, & Whited, 2011; Denis & McKeon, 2012; Ferrando et al., 2017; Gamba & Triantis, 2008; Marchica & Mura, 2010).

Briefly, according to the financial flexibility approach, firms deliberately choose zero leverage and high levels of cash holdings to preserve the future credit capacity for funding future investments projects with positive NPV. To test the argument of financial flexibility regarding zero leverage phenomenon, and following the previous empirical studies on the topic, we will analyse the effect of cash holdings and growth opportunities on firms' propensity to adopt zero leverage. Firms with higher levels of cash holdings and growth opportunities are expected to be more prone to present zero leverage. Therefore, the following hypotheses can be formulated:

H2: Financial flexibility increases the firm's likelihood of having zero leverage.

- H2a: Cash holdings have a positive effect on a firm's likelihood of having zero leverage;
- H2b: Growth opportunities have a positive effect on a firm's likelihood of having zero leverage.

2.3- Country-specific effect

The firm's financing decisions are also determined by the country's specific characteristics (Fan, Titman, & Twite, 2012), namely the kind of financial system. Analysing the phenomenon of extreme financial conservatism in a sample of European listed firms implies to highlight the importance of the banking sector. In recent decades, the European banking sector has shown strong development, presenting much stronger growth than that registered in other banking systems across the world (Langfield & Pagano, 2016). In the recent study developed by Takami (2016), it is argued that the reduced level of debt-free firms in Japan may be explained by the bank-based financial system that prevails in the country. Actually, although Japan is a country known for its highly developed banking system, Europe presents a greater weight of its banking system (Langfield & Pagano, 2016). Such a high preponderance of the bank-based financial system is reflected in the European firms' great dependence on funding from banks. Indeed,

European non-financial firms are more dependent on bank loans as the first source of external finance than firms in the US and Japan (European Investment Bank, 2015).

La Porta et al. (1998, 2002) argue that the common law system gives to the firm's external investor better protection than the civil law system, allowing easier access to capital market for firms located in countries with a common law system. This argument is corroborated by Fan et al. (2012), who show that lower leverage ratios are recorded in countries with a common law system. However, in countries with a civil law system, providing less shareholder protection, firms are more dependent on bank debt.

The country effect on zero leverage was explored by Bessler et al. (2013) and Ghoul et al. (2018). Bessler et al. (2013) based on an international sample, present evidence that a common law system increases firms' likelihood of having zero leverage. Also, using an international sample - listed firms in 76 developed and developing countries between 1990 and 2010 - Ghoul et al. (2018) report that zero leverage is in fact a global phenomenon, but more prominent in developed and high-income countries.

Contrary to Bessler et al. (2013) that considered the legal system prevailing in the country, the level of protection granted to the creditor and the tax system to examine the specific effect of the country on zero leverage, we will make this analysis through the financial system that prevails in the country. Given that there is a substantial difference among European countries, namely in terms of financial system development, the aim is to analyse the impact of the financial system on zero leverage. To examine the preponderance of this explanatory factor on zero leverage, we adopt an indicator provided by Demirgüç-Kunt and Levine (2004), which allows the creation of the *financial system* variable that equals to one if the financial system is market-based (a more developed capital market) and zero if the financial system is bank-based (a more developed banking sector). According to the arguments presented, the countries with market-based financial systems are expected to have a greater proportion of debt-free firms than those with a bank-based system. Therefore, the following research hypothesis is postulated:

H3: A financial system based on the capital market (bank) has a positive (negative) effect on zero leverage.

3- Data and Methodology

3.1- Data and Variables

The accounting, financial and market data about listed European firms were obtained from the Datastream database provided by Thomson Reuters. Data were collected for the period between 1995 and 2016 for listed firms in 14 Western European countries (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain, Sweden and the UK). The countries were selected to ensure the availability of information for listed firms during the period of analysis. As in previous studies about capital structure, firms of the utilities and financial sectors were excluded from the sample due to the regulations that these firms are subject to. Following the recent study developed by Sardo and Serrasqueiro (2018), we used the FTSE/Dow Jones Industry Classification Benchmark (ICB), and so firms with an industry code of 7000-7999 (Utilities), of 8000-8999 (Financials) and firms without industry code were excluded from the research sample. Then, we removed from the sample firm/year observations with missing information for total assets, sales and total debt (D'Mello & Gruskin, 2014). Finally, we excluded firm/year observations with invalid information or with errors for sales, assets and short and long-term debt. According to the suggestions of Guariglia (2008), in an attempt to mitigate potential survivor bias, we allowed firms' entry and exit from the sample. After applying those cleaning and filtering criteria, the final sample contained 8676 listed firms corresponding to an unbalanced panel data of 88348 firm/year observations.

Following an important number of studies on capital structure, namely on the topic of zero leverage, the book leverage ratio is calculated as the sum of short-term and long-term debt divided by total assets (Strebulaev & Yang, 2013)[5]. A firm is considered to adopt zero leverage (ZL) policy if short-term debt and long-term debt are equal to zero in a given year. This study focuses on financing decisions, and so the calculation of zero leverage considers financial debt rather than non-debt liabilities (Strebulaev & Yang, 2013).

Besides the explanatory variables used to capture the effects of the financial constraints and financial flexibility approaches, the model will contemplate control variables shown in previous studies as having power in explaining capital structure decisions. These control variables are: *taxes, non-debt tax shields, tangibility, profitability and capital expenditures* (Bessler et al., 2013; Dang, 2013; Strebulaev & Yang, 2013). Trying to explore the country's specific effect on zero leverage through the *financial system* variable, the classification of Demirgüç-Kunt and Levine

[5]In the case of listed firms, the use of market leverage becomes relevant (Byoun & Xu, 2013). In unreported results, available upon request, the analyses were replicated using the market leverage ratio – calculated as the ratio between book leverage and the market value of equity plus book leverage (Dang, 2013; Strebulaev & Yang, 2013) – and very similar conclusions were obtained.

(2004) was used. The countries were grouped in different financial systems according to their financial system being market-based or bank-based[6].

In order to control the macroeconomic effect, the *GDP growth rate* variable will be used. In addition, it is used an unexplored measure in the literature that highlights the period of recent crisis in Europe. Using the recent classification of Laeven and Valencia (2018), which considers both banking crises and sovereign debt crises, it is considered a period of crisis that goes from 2008 to 2009, 2011 or 2012, depending on the country being considered[7]. Specifically, following the global financial crisis, many European countries were heavily affected by sovereign debt crises, which justifies the analysis of the period up to 2012 in some cases (European Commission, 2014; European Investment Bank, 2015). Therefore, as a complementary measure to the *GDP growth rate*, the *crisis dummy* variable will be used. Also, the model contemplates dummy variables for industry, country and year, seeking to control non-observed specific effects.

3.2- Methods and empirical model

The current study performs univariate and multivariate analyses to test the firms' characteristics that stimulate the zero leverage policy. As a result of the use of a binary dependent variable (assuming the values of 0 and 1), it is required the use of econometric methods that consider this characteristic, since, for example, standard estimators such as ordinary least squares (OLS) assume that the dependent variable can take on any real negative or positive value (Elsas & Florysiak, 2015). Consequently, in the multivariate analysis, a logistic regression model is used to estimate the impact of firms' specific characteristics and macroeconomic factors on their likelihood of having zero leverage (ZL). The model has the following form:

$$PR(ZL=1|X) = 1/\{1+e^{-(\alpha+X\beta)}\} \quad (1)$$

where the dependent variable ZL is a binary variable with the value of 1 if the firm has zero leverage in a given year and 0 otherwise, X represents the vector of the explanatory variables defined in Table 1, β represents the vector of the variable coefficients and α is the constant of the model.

[6]According to Demirgüç-Kunt and Levine (2004), Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Portugal and Spain belong to bank-based financial systems, while Denmark, the Netherlands, Sweden and the UK belong to market-based financial systems.

[7]The longer crisis period is considered only for the following countries: Austria, Belgium, Greece, Ireland, Portugal and Spain. For UK the crisis period is 2008-2011 and for the remaining countries only the 2008-2009 period is considered as a crisis period. See Laeven and Valencia (2018).

Table 1: Definition of the variables

Variable	Definition
ZL	Dummy that equals 1 if a firm has a zero book leverage in a given year and 0 otherwise
Book leverage	Ratio of long- and short-term debt to total book assets
Size	Logarithm of total book assets
Growth Opportunities	Market-to-book ratio (the market value of equity plus the book value of debt, divided by total assets)
Cash Holdings	Ratio of cash and short-term investments to book assets
Tangibility	Ratio of fixed assets to total book assets
Profitability	Ratio of earnings before interests, taxes, and depreciation (EBITDA) to total book assets
Capital expenditures	Ratio of capital expenditures to total book assets
Dividend payout	Ratio of common dividend to total book assets
Taxes	Ratio of income taxes paid to total book assets
Non-debt tax shields	Ratio of depreciation and amortizations to total book assets
GDP growth rate	Annual real GDP growth rate (Source: World Bank, 2017)
Crisis dummy	Equals 1 if the observation correspond to the years of financial and sovereign debt crises in Europe (is considered a period of crisis that goes from 2008 to 2009, 2011 or 2012, depending on the country being considered) and 0 otherwise (Source: Laeven & Valencia, 2018)
Financial system	Equal to 1 if a financial system is market-based (a higher level of stock market development relative to banking sector development), and 0 if it is bank-based (Source: Demirgüç-Kunt & Levine, 2004)

4- Empirical results

4.1- Univariate analysis

4.1.1- Research Sample

Seeking to explore the zero leverage phenomenon in the European listed firms, we begin by presenting a brief description of the research sample. Table 2, Panel A, shows the distribution of observations and firms by country. Panel B of Table 2 presents the distribution of debt-free firms by industry, using the FTSE/Dow Jones Industry Classification Benchmark (ICB) to classify industry.

Table 2: Sample characterisation by country and industry

Panel A – Distribution of observations and firms by country					
	All firms			Debt-free firms	
Country	N. obs.	% obs.	N. firms	% obs.	% firms*
Austria	1,519	1.72	137	8.16	23.36
Belgium	2,095	2.37	176	3.72	14.20
Denmark	2,741	3.10	227	7.30	21.15
Finland	2,636	2.98	202	3.76	13.37
France	14,254	16.13	1,312	2.40	9.45
Germany	12,992	14.71	1,129	12.85	34.46
Greece	4,682	5.30	356	7.35	29.78
Ireland	1,164	1.32	117	11.08	32.48

Italy	4,297	4.86	381	2.19	9.97
Netherlands	3,248	3.68	292	9.21	26.37
Portugal	1,149	1.30	105	2.61	9.52
Spain	2,500	2.83	215	2.12	11.63
Sweden	7,835	8.87	832	20.36	46.15
UK	27,236	30.83	3,195	16.61	37.12
Total	88,348	100	8,676	10.84	28.92

* Firms that present zero leverage levels in at least one year.

Panel B – Distribution by industry			
	All firms	Debt-free firms	
Industry	N. obs.	N. obs.	% obs.
Basic Materials	6,002	529	8.81
Consumer goods	14,994	1,013	6.76
Consumer services	15,944	1,692	10.61
Health care	6,706	1,084	16.16
Industrials	26,825	1,969	7.34
Oil & Gas	3,110	567	18.23
Technology	13,287	2,591	19.50
Telecommunications	1,480	134	9.05
Total	88,348	9,579	10.84

Most firms in the sample are from the UK, France and Germany. It is worthy to refer that debt-free firms exist in all countries of the research sample. Between 1995 and 2016 around 10.84% of firm-year observations in the sample are classified as having zero leverage. The dimension of this result is even more noteworthy if we consider that over 25% of firms in the sample present zero leverage levels in at least one year. However, the values presented are lower than those reported in the majority of studies developed in the US (Byoun & Xu, 2013; D'Mello & Gruskin, 2014) and in the UK (Dang, 2013). Compared with studies using international samples, the values presented here are also lower than those found by Bessler et al. (2013) and Ghoul et al. (2018) that present values close to 18% and 13% of observations corresponding to debt-free firms, respectively.

A more detailed analysis reveals great heterogeneity in the distribution of zero leverage firms between countries. In this context, Sweden (20.36%) and UK (16.61%) present the greatest proportion of observations of debt-free firms. However, countries such as France, Italy, Portugal and Spain present a proportion of debt-free firms that does not reach 3%, a figure far below than that reported in most studies. This is lower than the figures reported by Takami (2016) for a sample of listed Japanese firms. These results suggest a relationship between the level of development of the financial system and the zero leverage phenomenon.

Panel B of Table 2 reveals that all industries have debt-free firms, showing that zero leverage is not exclusive of some industries (Broun & Xu, 2013; Strebulaev & Yang, 2013). However, sectors such as technology (19.5%), oil and gas (18.23%) and healthcare (16.16%), particularly, present higher proportions of debt-free firms, suggesting that zero leverage can partially be explained by specific industry factors, as argued by Dang (2013) and D'Mello and Gruskin (2014).

4.1.2- Trends of conservative levels of debt

The literature is consensual about an increasing trend towards zero leverage over the years (e.g. Bessler et al., 2013; D'Mello & Gruskin, 2014; Ghoul et al., 2018). In order to confirm a similar trend in Europe, we examine the evolution of conservative levels of debt over the period of analysis. Different measures of extreme conservatism are adopted, namely zero leverage (ZL) and almost zero leverage (AZL). AZL is a dummy variable that takes the value of 1 if the book leverage ratio is below 5% (Strebulaev & Yang, 2013). It is noted that this AZL was the measure used by the first studies that have focused on conservative levels of debt (e.g. Minton & Wruck, 2001). AZL continues to be used in contemporary studies about conservative debt in order to provide a clear picture of the phenomenon of financial conservatism, since it allows to analyse low debt levels but above zero (Strebulaev & Yang, 2013). Finally, in order to assure that zero leverage is not a result of temporary changes in capital structure, but a result of a persistent financial policy, we follow Devos et al. (2012) classifying a firm as having zero leverage if during three consecutive years it has no debt in its capital structure (ZL3). Table 3 and Figure 1 present the distribution of firms with conservative levels of debt over the years.

Table 3: Evolution over time of conservative levels of debt

Panel A presents the evolution of conservative debt levels in the whole sample. Panel B shows the evolution over time of conservative debt levels in both market-based and bank-based financial systems.

	Panel A: Full sample				**Panel B: Market-based**				**Panel B: Bank-based**			
Year	**N**	**ZL%**	**AZL%**	**ZL3%**	**N**	**ZL%**	**AZL%**	**ZL3%**	**N**	**ZL%**	**AZL%**	**ZL3%**
1995	2,815	5.15	19.01	0.00	1,459	6.79	21.25	0.00	1,356	3.39	16.59	0.00
1996	3,803	7.15	21.85	0.00	1,891	8.78	24.75	0.00	1,912	5.54	18.99	0.00
1997	4,263	6.92	23.04	1.71	2,039	8.88	25.36	2.45	2,224	5.13	20.91	1.03
1998	4,402	7.38	23.15	2.66	1,989	10.06	26.04	3.57	2,413	5.18	20.76	1.91
1999	4,441	8.04	24.93	2.88	1,938	11.25	27.61	4.28	2,503	5.55	22.85	1.80
2000	4,474	8.47	27.58	2.86	1,923	11.96	31.93	4.26	2,551	5.84	24.30	1.80
2001	4,379	8.95	26.19	3.06	1,925	13.25	30.86	4.26	2,454	5.58	22.53	2.12
2002	4,275	9.47	25.73	4.00	1,916	13.83	31.05	6.11	2,359	5.93	21.41	2.29
2003	4,182	10.59	26.47	4.33	1,889	15.40	31.60	6.72	2,293	6.63	22.24	2.35
2004	4,290	12.17	28.25	5.43	1,977	17.45	33.74	7.79	2,313	7.65	23.56	3.42
2005	4,422	12.55	28.83	5.68	2,069	19.04	35.96	8.70	2,353	6.84	22.57	3.02

2006	4,450	12.81	29.10	5.98	2,116	19.47	35.78	9.07	2,334	6.77	23.05	3.17
2007	4,393	12.79	27.79	7.15	2,090	19.57	34.40	11.39	2,303	6.64	21.80	3.30
2008	4,179	12.11	26.13	7.37	1,955	18.93	32.79	11.97	2,224	6.12	20.28	3.33
2009	4,003	12.69	26.41	8.07	1,852	19.17	33.15	12.69	2,151	7.11	20.60	4.09
2010	3,884	12.87	26.78	7.88	1,791	19.82	34.06	12.17	2,093	6.93	20.54	4.20
2011	3,826	13.43	27.89	7.95	1,771	20.84	36.19	11.97	2,055	7.06	20.73	4.48
2012	3,725	13.37	27.06	7.97	1,751	20.62	34.49	12.28	1,974	6.94	20.47	4.15
2013	3,692	12.97	26.95	7.75	1,746	19.99	35.34	11.80	1,946	6.68	19.42	4.11
2014	3,635	13.92	28.39	7.98	1,726	21.44	37.78	11.99	1,909	7.12	19.91	4.35
2015	3,491	12.86	26.67	7.45	1,652	20.40	35.17	11.56	1,839	6.09	19.03	3.75
2016	3,324	11.94	25.75	7.40	1,595	17.93	32.85	11.03	1,729	6.42	19.20	4.05
Total	**88,348**	**10.84**	**26.20**	**5.22**	**41,060**	**16.12**	**31.95**	**7.96**	**47,288**	**6.26**	**21.20**	**2.85**

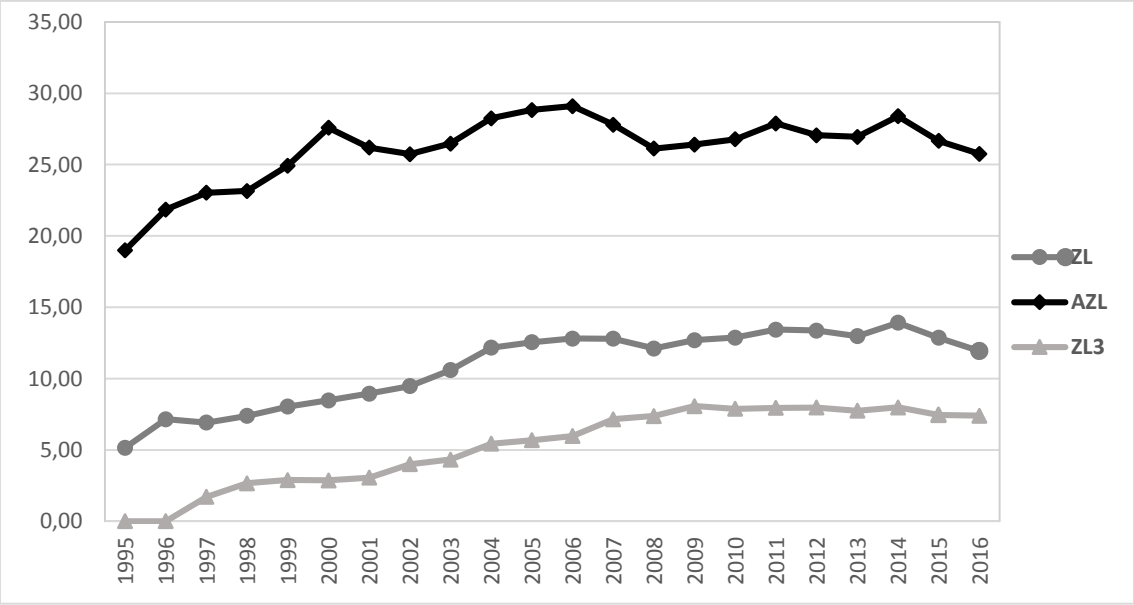

Fig. 1: Evolution over time of conservative debt levels in the whole sample

Both Panel A of Table 3 and Figure 1 show an increasing trend of conservative levels of debt for the whole sample. The proportion of firms with zero leverage, in 1995, was 5.15%, reaching 11.94% in 2016, more than doubling during the period of analysis. However, if the increase was fairly steady until 2007, a decrease was recorded, from 12.79% in 2007 to 12.11% in 2008. In the following years, the increasing trend of the proportion of debt-free firms restarted, and peaked in 2014 (13.92%).

We highlight that, on average, around 26% of firms have AZL and more than 5% do not report debt for a minimum period of 3 consecutive years, showing that conservative debt is not just a transitory financial policy. A similar trend was shown by Devos et al. (2013) and D'Mello and

Gruskin (2014) for US samples, and by Bessler et al. (2013) for an international sample. The European firms in our sample present levels of zero leverage that are systematically lower than those reported annually for US samples (Devos et al., 2013; D'Mello & Gruskin, 2014).

To assess the inequality in the distribution of debt-free firms between countries, Panel B of Table 3 and Figure 2 present the evolution of zero leverage in financial systems with different levels of development. As in Demirgüç-Kunt and Levine (2004), the countries were grouped in different financial systems according to their financial system being market-based or bank-based.

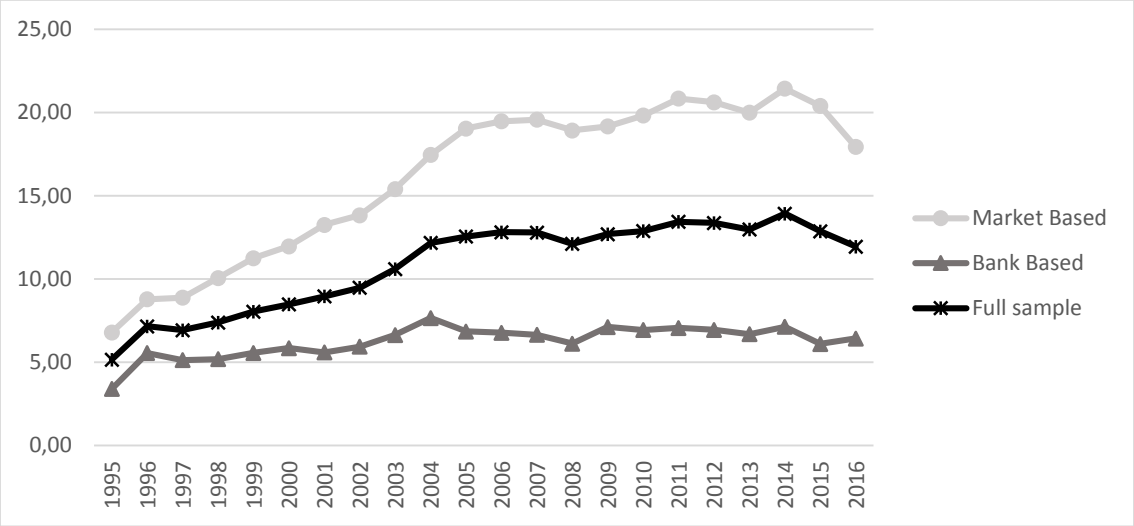

Fig. 2: Evolution over time of zero leverage levels in different financial systems and in the whole sample

The results presented in Panel B of Table 3 and in Figure 2, show clearly the inequality in the distribution and evolution of zero leverage between financial systems. In countries with a market-based financial system, zero leverage shows a trend to increase considerably over the years, with the proportion of debt-free firms almost tripling between the beginning (6.79%) and the end of the period of analysis (20.40% in 2015 and 17.93% in 2016). However, for countries with a bank-based financial system, the increase of zero leverage is much less noticeable. In fact, considering the evolution from 1996 (5.54%) to 2016 (6.42%), we find that the increase of zero leverage is residual, not even reaching 1p.p.. In bank-based financial systems, the proportion of debt-free firms increases slightly until 2004 and then falls until 2008, with the figure remaining similar until 2016.

Although showing lower values, our sub-sample of countries with a market-based financial system (on average, 16.12% of firms are classified as zero leverage) presents an increasing trend

in line with the findings of Bessler et al. (2013) for their sub-sample of countries with a common law system and by Ghoul et al. (2018) for high-income OECD countries. Because a similar trend is not found in our sub-sample of European countries with a bank-based financial system, our results seem to corroborate the arguments of Takami (2016) regarding the determinant role of the level of development of the financial system in explaining zero leverage.

4.1.3- Descriptive statistics and correlation analysis

Table 4 presents descriptive statistics for the variables of the study. The descriptive statistics are presented in Panel A for the whole sample, in Panel B for the countries with a market-based financial system and in Panel C for the countries with a bank-based financial system.

Table 4: Descriptive statistics

	Panel A: Full sample			**Panel B: Market based**			**Panel C: Bank based**		
Variable	N	mean	s.d.	N	mean	s.d.	N	mean	s.d.
ZL	88,348	0.1084	0.3109	41,060	0.1612	0.3677	47,288	0.0626	0.2423
Leverage	88,348	0.2022	0.1743	41,060	0.1769	0.1689	47,288	0.2242	0.1759
Size	88,348	11.6306	2.2382	41,060	11.3415	2.2917	47,288	11.8817	2.1595
Cash ratio	88,226	0.1524	0.1755	41,008	0.1622	0.1918	47,218	0.1439	0.1596
Growth Opportunities	79,490	1.4309	1.7284	37,257	1.6410	1.9729	42,233	1.2456	1.4546
Tangibility	88,072	0.2477	0.2233	40,873	0.2521	0.2404	47,199	0.2438	0.2073
Profitability	86,423	0.0702	0.2278	40,346	0.0439	0.2803	46,077	0.0932	0.1656
Capital expenditures	82,765	0.0540	0.0687	40,115	0.0533	0.0704	42,650	0.0547	0.0671
Dividend Payout	83,785	0.0178	0.0387	40,176	0.0199	0.0404	43,609	0.0158	0.0370
Taxes	81,690	0.0157	0.0343	39,062	0.0149	0.0351	42,628	0.0165	0.0335
Non-debt tax shields	87,774	0.0497	0.0480	40,805	0.0484	0.0482	46,969	0.0508	0.0478

In our sample, the firms present, on average, book leverage ratios of approximately 20%, a figure close to that reported in the literature for European firms (e.g. Campbell & Rogers, 2018). Panels B and C of the Table 4 highlight that, on average, the debt ratio in countries with a bank-based financial system (around 22%) is greater than that in countries with a market-based financial system (around 17%).

Table 5 presents the Pearson paired correlation coefficients between the variables of the study.

Table 5: Pearson correlation matrix and Variance Inflation Factor

The table shows the Pearson correlation coefficients between the variables of the study, and the coefficients associated with the VIF. ** significance at 1%; * significance at 5%

Variables	ZL	Size	Cash holdings	Growth Opportunities	Tangibility	Profitability	Capital Expenditures	Dividend payout	Taxes	Non-debt tax shields	VIF
ZL	1.0000										
Size	-0.2724**	1.0000									1.18
Cash holdings	0.3791**	-0.2429**	1.0000								1.30
Growth Opp.	0.1928**	-0.1886**	0.3149**	1.0000							1.19
Tangibility	-0.1754**	0.2291**	-0.3306**	-0.1298**	1.0000						1.42
Profitability	-0.1120**	0.2515**	-0.1893**	-0.0907**	0.1207**	1.0000					1.43
Capital Exp.	-0.0699**	0.0186**	-0.1087**	0.0463**	0.4291**	0.0696**	1.0000				1.33
Dividend pay.	0.0921**	0.0593**	0.0555**	0.1440**	-0.0110**	0.2607**	0.0056	1.0000			1.18
Taxes	0.0098**	0.1166**	0.0083*	0.1090**	0.0027	0.4519**	0.0499**	0.3361**	1.0000		1.38
Nondebttaxshields	-0.0410**	-0.0836**	-0.0935**	-0.0020	0.1310**	-0.0564**	0.2147**	-0.0325**	-0.0639**	1.0000	1.08
										Mean VIF	1.28

The results in Table 5 show that the dependent variable ZL is significantly correlated with all the explanatory variables representing financial constraints and financial flexibility approaches as well as with all the remaining control variables. These results indicate that the variables used in the current study contribute for explaining the ZL behaviour. The correlations between the explanatory variables seem not to be particularly high, always presenting coefficients under 0.5. As shown in the last column of the Table 5, the variance inflation factor (VIF) is always under 2, suggesting that multicollinearity is not a problem[8].

4.1.4- Univariate comparison between zero leverage and leveraged firms

Table 6 presents, in columns 1 and 2, the average values of the (continuous) explanatory variables both for zero leverage firms and non-zero leverage firms. Column 3 presents the results of a t-test for mean differences between the two groups of firms, and column 4 the respective p-value.

Table 6: Characteristics of debt-free firms

Variables	**ZL firms (1)**	**Leveraged firms (2)**	**T-test for diff. in means (3)**	**P-value (4)**
Size	9.882	11.843	-84.150	0.0000
Cash holdings	0.343	0.129	120.000	0.0000
Growth Opportunities	2.398	1.316	55.383	0.0000
Tangibility	0.135	0.261	-52.860	0.0000
Profitability	-0.004	0.079	-33.145	0.0000
Capital expenditures	0.040	0.056	-20.163	0.0000
Dividend payout	0.028	0.017	26.782	0.0000

[8] Kennedy (1992) mentions that VIF values above 10 indicate the presence of harmful problems of multicollinearity.

Taxes	0.017	0.016	2.811	0.0049
Non-debt tax shields	0.044	0.050	-12.169	0.0000
Observations	9,579	78,769		

The results in Table 6 reveal that debt-free firms are smaller than leveraged firms, which agrees with the hypothesis of zero leverage arising from financial constraints (Hadlock & Pierce, 2010). However, on average, debt-free firms, pay out more dividends as a percentage of assets than leveraged firms. This result is against to the financial constraints approach according to which firms with zero leverage pay lower level of dividends in order to maintain a financial slack, avoiding the need to rely on external finance at a high cost (Cleary, 2006; Fazzari et al., 1988).

Additionally, the results show that firms with zero leverage, on average, present higher levels of growth opportunities and internal liquidity than leveraged firms. These results are according to the results of Dang (2013), and consistent with the argument of zero leverage being a financing decision of the firm's goal of maintaining financial flexibility. The debt-free firms are motivated to maintain high levels of cash holdings to preserve their debt capacity, in order to fund future valuable growth opportunities (Marchica & Mura, 2010; Rapp et al., 2014). Simultaneously, debt-free firms present lower levels of capital expenditures than leveraged firms, which reinforces that the former pursue the goal of maintaining financial flexibility (Marchica & Mura, 2010). The remaining evidence points out that debt-free firms have lower levels of tangible assets and a higher tax ratio than leveraged firms. These results are in line with the previous empirical evidence (Bessler et al., 2013) and according to the predictions of trade-off theory. However, the fact of debt-free firms presenting lower non-debt tax shields than leveraged firms, contradicts the predictions of trade-off theory (DeAngelo & Masulis, 1980).

Finally, debt-free firms present lower level of profitability than leveraged firms, contradicting the predictions of the pecking order theory and the evidence obtained by Huang et al. (2017). More interesting is that debt-free firms, on average, present negative profitability, but even so they pay, on average, higher dividends. These results make the higher level of dividend payout in debt-free firms even more enigmatic, and, potentially, revealing different characteristics between zero leverage firms. Therefore, zero leverage in Europe may be the result of a group of highly profitable firms that pay dividends, and a second group of less profitable firms not paying dividends.

To confirm the situation, Table 7 presents the division of the sample into firms with zero leverage that pay and do not pay dividends, and compares them with leveraged firms with similar dividend payment status.

Table 7: Characteristics of debt-free firms separated by dividend payment status

This table compares the mean of the characteristics of debt-free firms with different levels of constraints, using dividends to separate the sample (ZL non-payers and ZL payers), with leveraged firms with different levels of constraints (Leveraged non-payers and Leveraged payers). Finally, t-tests are presented for the differences between the means.

* significance at 10%, ** significance at 5% and *** significance at the 1% level.

Variables	**ZL non-payers (1)**	**ZL payers (2)**	**Leveraged non-payers (3)**	**Leveraged payers (4)**	**T-test for diff. in means (1) vs (2)**	**T-test for diff. in means (1) vs (3)**	**T-test for diff. in means (2) vs (4)**
Size	9.442	10.694	10.900	12.641	-36.323***	-51.830***	-56.717***
Cash holdings	0.391	0.287	0.155	0.111	19.822***	78.739***	84.333***
Growth opportunities	2.692	2.075	1.434	1.232	9.689***	36.491***	37.395***
Tangibility	0.109	0.173	0.232	0.285	-16.404***	-35.770***	-30.671***
Profitability	-0.143	0.186	0.000	0.133	-42.614***	-31.036***	28.888***
Capital expenditures	0.039	0.041	0.052	0.058	-1.699*	-11.175***	-15.658***
Dividend Payout	0.000	0.067	0.000	0.028	-58.622***	-	50.296***
Taxes	0.000	0.040	0.004	0.023	-36.220***	-6.785***	34.046***
Non-debt tax shields	0.047	0.039	0.057	0.046	6.335***	-9.854***	-11.407***
Observations	5,144	3,717	30,371	44,553			

The results of Table 7 reveal the existence of two types of zero leverage firms that present different levels of financial constraints. Specifically, the number of debt-free firms that do not pay dividends (column 1) is greater than the group of ZL firms that pay dividends (column 2). The ZL firms that do not pay dividends are the smallest firms, with less level of tangible assets, and have lower levels of profitability. These are typical characteristics of financially constrained firms (Bessler et al., 2013; Fazzari et al., 1988; Hadlock & Pierce, 2010; Titman & Wessels, 1988). Simultaneously, ZL firms that do not pay dividends are the group with greater levels of cash holdings and growth opportunities, a result that cannot be seen as the search for financial flexibility, but rather the result of zero leverage firms that do not pay dividends being debt constrained. Therefore, internal liquidity is fundamental to fund firm's activity and future investments (Denis & Sibilkov, 2010).

In opposition, ZL firms that pay dividends (column 2) emerge as the most profitable group of firms and paying the highest dividends, even compared to leveraged firms that pay dividends (column 4). In addition, these firms present higher levels of cash holdings and growth opportunities, but they are smaller and present lower level of tangible assets in comparison to the leveraged firms. ZL firms that pay dividends are larger, present higher levels of tangible assets and profitability than ZL firms that do not pay dividends. Thus, the enigmatic evidence that ZL firms are the firms paying the highest levels of dividends and, simultaneously, presenting negative levels of profitability, is explained by the existence of two types of debt-free firms: a group of

firms that do not pay out dividends and present high negative levels of profitability; and, a group of firms that pay high dividends and present high levels of profitability.

For the group of ZL firms that do not pay dividends, the evidence is clearly in favour of zero leverage as a consequence of the existence of financial constraints. In the group of ZL firms that pay dividends, the results are partially in favour of ZL as a consequence of the firm's financing decisions, namely seeking to maintain financial flexibility.

Seeking to confirm the existence of two types of firms with different levels of financial constraints (constrained and unconstrained) Table A1 in Appendix A, presents the division of the sample in financially constrained and unconstrained firms in accordance with the SA-index (Hadlock & Pierce, 2010). Adopting a method identical to that used by Bessler et al. (2013) to separate firms into different quintiles of constraints the results obtained are very similar to those shown when we divide the sample according to the dividend payment status (Table 7). Suggesting that the majority of debt-free firms are financially constrained, which are in accordance with the results of Bessler et al. (2013).

The analysis carried out in the univariate section shows that zero leverage varies among countries, particularly among countries with different types of financial systems. Additionally, it is suggested that zero leverage is simultaneously associated with financial constraints and financial flexibility approaches, revealing the existence of two types of debt-free firms: highly profitable firms that pay dividends and do not need external finance, and, thus, accumulating cash holdings until good investment opportunities arise (financially unconstrained firms); and, smaller firms with low level of tangible assets and negative levels of profitability that cannot obtain external finance, depending on internal finance (financially constrained firms).

4.2- Multivariate analysis

4.2.1- Main findings

Table 8 presents the results from the logistic regression models. Different specifications of equation 1 were adopted, corresponding each specification to a different model. The dependent variable of the models is the binary variable ZL. For each independent variable, we report the coefficient resulting from the logit regression, the z statistic in brackets and the (average) partial effects. The partial effects ($\partial P/\partial X$) measure the probability of a change in ZL policy through the change in 1 standard deviation in an independent variable or through the change from 0 to 1 in a dummy variable (Wooldridge, 2012). In addition, we provide robust standard errors that are adjusted for heteroscedasticity and clustered by firm to mitigate concerns about within-firm correlation (Petersen, 2009).

Model 1 is the base model and incorporates the explanatory variables representing the financial constraints and financial flexibility approaches as well as a set of variables at the firm level identified as determinants of firm's capital structure. Model 2 adds industry dummies (based on the 1-digit ICB code), year dummies and country dummies to mitigate concerns about omitted variables[9]. The following models introduce specific variables to control the effect of time, therefore, such as Bessler et al. (2013), year dummies are not used. Specifically, Model 3 adds macroeconomic control variables, through the *GDP growth rate* variable, while Model 4 intends to capture the specific effect of the recent crisis on zero leverage, introducing the *crisis dummy* variable. Model 5 incorporates the *financial system* variable to control the specific effect of the financial system on zero leverage. Finally, Model 6 incorporates all explanatory variables, i.e., firm specific, macroeconomic and financial system variables.

Table 8- Main regressions results

Table 8 presents the main results of the regression. The dependent variable takes the value of 1 if the firm has no debt in a given year and 0 otherwise. For each independent variable we report the regression coefficients, the z-statistics (in brackets) and marginal effects (Average Partial Effects). The fixed effects are indicated at the bottom of each column. Robust standard errors are adjusted for heteroscedasticity and clustered by firm.

***,**,* indicates statistical significance at 1%, 5% e 10% respectively.

Independent variables	**1 Base model**	**2 Year, country and industry**	**3 GDP**	**4 Crisis**	**5 Financial system**	**6 All control variables**
Size	-0.478***	-0.425***	-0.421***	-0.421***	-0.429***	-0.420***
	(-24.85)	(-22.02)	(-21.88)	(-21.85)	(-22.64)	(-21.85)
	-0.032	-0.027	-0.027	-0,027	-0.028	-0,027
Cash holdings	3.897***	4.159***	4.093***	4.098***	4.044***	4.101***
	(29.59)	(29.09)	(29.03)	(29.01)	(29.54)	(29.04)
	0.264	0.262	0.260	0,260	0.264	0,261
Growth	0.039***	0.031**	0.026**	0.026**	0.024**	0.027**
opportunities	(3.30)	(2.48)	(2.16)	(2.15)	(2.01)	(2.23)
	0.003	0.002	0.002	0,002	0.002	0,002
Dividend payout	5.985***	5.787***	6.129***	6.144***	5.919***	6.131***
	(9.49)	(9.15)	(9.65)	(9.66)	(9.90)	(9.65)
	0.406	0.365	0.390	0,390	0.387	0,390
Tangibility	-0.872***	-0.886***	-1.139***	-1.122***	-1.042***	-1.123***
	(-3.87)	(-3.96)	(-5.00)	(-4.92)	(-4.65)	(-4.93)
	-0.059	-0.056	-0.072	-0,071	-0.068	-0,071
Profitability	0.280***	0.414***	0.417***	0.409***	0.370***	0.415***

[9]In unreported results, we verified that the use of different combinations of fixed effects (industry, year and country) provides similar results than those obtained in models 1 and 2.

	(3.19)	(4.64)	(4.71)	(4.66)	(4.19)	(4.71)
	0.019	0.026	0.026	0,026	0.024	0,026
Capital expenditures	-0.613	-0.338	-0.760*	-0.791*	-0.866*	-0.762*
	(-1.36)	(-0.78)	(-1.66)	(-1.73)	(-1.90)	(-1.66)
	-0.042	-0.021	-0.048	-0,050	-0.057	-0,048
Taxes	1.941***	3.410***	2.440***	2.419***	2.386***	2.447***
	(3.11)	(5.06)	(3.74)	(3.71)	(3.77)	(3.76)
	0.132	0.215	0.155	0,154	0.156	0,155
Non-debt tax shields	-1.900***	-2.098***	-2.010***	-1.927***	-1.824***	-1.958***
	(-3.34)	(-3.60)	(-3.53)	(-3.40)	(-3.24)	(-3.45)
	-0.129	-0.132	-0.128	-0,122	-0.119	-0,124
GDP growth rate			-0.047***			-0.027***
			(-6.03)			(-2.99)
			-0.003			-0,002
Crisis dummy				0.283***		0.180***
				(5.67)		(3.00)
				0,018		0,011
Financial system					0.970***	1.214***
					(12.82)	(2.88)
					0.063	0,077
Constant	2.341***	2.609***	2.468***	2.305***	1.442***	1.160***
	(10.72)	(11.01)	(11.34)	(10.46)	(6.24)	(2.39)
Year Dummies	No	Yes	No	No	No	No
Industry Dummies	No	Yes	Yes	Yes	Yes	Yes
Country Dummies	No	Yes	Yes	Yes	No	Yes
Observations	69,495	69,495	69,495	69,495	69,495	69,495
Wald test	2456.66***	2714.90***	2734.19***	2729.39***	2661.96***	2732.28***
Pseudo R2	0.2638	0.3254	0.3184	0,3185	0.2932	0,3187
Correct classific.	90.61%	91.12%	91.07%	91.09%	90.92%	91.08%

The econometric tests performed confirm the suitability of the logit regression models[10]. In general, the Pseudo R-squared varies between 26.38% and 32.54%, being these values in line with those reported in previous studies (Bessler et al., 2013; Ghoul et al., 2018). The base model, Model 1, shows that all explanatory variables are statistically significant in explaining ZL, except the *capital expenditures* variable. In particular, the *size* variable, a proxy of the financial

[10]For all models the Wald test is rejected, meaning that the variables forming the models are able to explain ZL behaviour, with the percentage of values being correctly forecast (goodness of fit measure) by the model always above 90% (Wooldridge, 2002; 2012).

constraints, presents a negative and statistically significant effect on zero leverage. The increase of one standard deviation in the s*ize* variable corresponds to a fall of 3.2% in the firm's likelihood of having ZL.

Consequently, the results suggest that smaller firms are more likely to present zero levels of debt, which is in accordance with the financial constraints hypothesis. Thus, smaller firms face more difficulties in obtaining external finance, probably due to creditors demanding higher compensation for lending money to firms with low reputation (Hadlock & Pierce, 2010; Stiglitz & Weiss, 1988). This result corroborates hypothesis H1a and the results of previous studies (Bessler et al., 2013; Strebulaev & Yang, 2013).

Dividend payments, our second proxy of financial constraints, presents a positive and statistically significant effect on ZL. This result allows us to reject hypothesis H1b. The dividend payments present the greatest economic impact on zero leverage, namely the increase of one standard deviation on the dividend payment ratio, ceteris paribus, increases the likelihood of ZL by around 40%. This result contrasts with the arguments of financial constraints, whereby firms paying lower dividends are more likely to adopt zero leverage due to higher costs of information asymmetry. However, the result obtained is in accordance with the results of Bessler et al. (2013) and Byoun and Xu (2013) for the variable related to dividends payment. Given that the distribution of dividends is a way to avoid managers taking hold of free cash-flows (Jensen, 1986; Fama & French, 2002), a possible explanation of the result obtained is that dividends can be used by firms with zero leverage to control problems of free cash-flow (Easterbrook, 1984).

However, the results should be interpreted with caution, because as we saw in the univariate analysis, there are debt-free firms with different characteristics according to the dividend payment status. Considering the results obtained for financially constrained ZL firms (that do not pay dividends) and financially unconstrained firms (that pay dividends), further analysis should be made to analyse in detail the effect of financial constraints on zero leverage. Particularly, further analysis should be made to understand if between those two groups of firms there are different motives for adopting zero leverage policies. In resume, hypothesis H1 is only partially validated.

Concerning the variables representing the financial flexibility approach, i.e., *cash holdings* and *growth opportunities*, these variables present positive and statistically significant effects on the firm's likelihood of having zero leverage. Specifically, the increase of one standard deviation in the level of cash holdings, with the other variables remaining constant, increases by around 26% a firm's likelihood of having zero leverage. The *growth opportunities* variable presents a lower economic impact on the firm's likelihood of having zero leverage (approximately 0.3%). These results confirm the expected positive impacts of the cash holdings and growth opportunities variables on the likelihood of zero leverage. These results corroborate hypotheses H2a and H2b.

Consequently, the results are according to the arguments of financial flexibility, whereby firms with high levels of cash holdings and valuable growth opportunities present zero leverage to hold on debt capacity, in order to fund future good growth opportunities (Marchica & Mura, 2010; Rapp et al., 2014).

Similar results in favour of the financial flexibility approach were presented by Dang (2013). The goal of maintaining financial flexibility, measured by cash holdings and growth opportunities, seems to explain the firm's likelihood of having zero leverage. Thus, on the basis of these results, hypothesis H2 is validated.

Regarding the other control variables, tangible assets present a negative and statistically significant coefficient on firm's likelihood of having zero leverage. This result although being in accordance with the predictions of the trade-off theory is often interpreted, in the literature, as a signal of the existence of financial constraints (Bessler et al., 2013; Dang, 2013; Ghoul et al., 2018). Specifically, if we consider that tangible assets serve as collateral to debt, firms with lower asset tangibility are more likely to face information asymmetries and consequent credit rationing (Titman & Wessels, 1988). The *profitability* variable presents a positive and statistically significant effect on zero leverage. This result is in accordance with the predictions of the pecking order theory as well as with the conclusions of Bessler et al. (2013). Finally, higher tax ratios and lower level of non-debt tax shields are related to debt-free firms, corroborating the results of Dang (2013).

The introduction of the industry, year and country dummies (Model 2) do not change the main conclusions obtained in the base model. Models 3 and 4 added the control variables as proxies of the macroeconomic conditions. According to the results shown in Model 3, the *GDP growth rate* variable presents a negative and statistically significant effect, indicating that adverse economic conditions, reflected in lower rates of GDP growth, stimulate the emergence of zero leverage firms (Dang 2013; Ghose & Kabra, 2016).

In order to analyse more thoroughly the effect of the recent economic and sovereign debt crises on zero leverage, Model 4 introduces the *crisis dummy* variable. The results reveal that the coefficient of this variable is positive and statistically significant in explaining zero leverage, and that, during this period, the likelihood of firms adopting zero leverage increased by around 1.8%. This suggests that the recent financial and sovereign debt crises had an impact on decisions related to firms' capital structure in the European context, showing a greater trend towards zero leverage during this period[11].

[11]In results that are not reported, it was confirmed that the use of two distinct crises periods: financial crises (2008-2009) and sovereign debt crises (2010-2012) arrives at the same results, with both periods representing a positive impact on ZL.

To examine the effect of the financial system's development on zero leverage, Model 5 incorporates the *financial system* dummy variable that takes the value of 1 for market-based financial systems and 0 for bank-based financial systems. The results confirm that the *financial system* dummy variable has a positive and statistically significant coefficient, implying that a firm located in a market-based financial system is more likely to have zero leverage. Specifically, belonging to a market-based financial system rather than a bank-based one, ceteris paribus, increases by around 6.3% the firm's probability of having zero leverage. The results validate hypothesis H3, evidencing the contribution of the financial system for explaining the zero leverage phenomenon. This evidence confirms the arguments used by Takami (2016), justifying the limited levels of zero leverage found in Japanese firms. Indeed, firms' great dependence on bank finance in bank-based financial systems, as is mostly the case in Europe (Langfield & Pagano, 2016), implies that the likelihood of a firm having zero leverage is much lower than in market-based financial systems.

These results, together with the evidence from the distribution of firms with zero leverage according to the financial system, provide strong implications for the literature, namely: i) showing that the financial system, prevailing in the country, has strong implications for the adoption of zero leverage, being one of the main determinants of the firm's likelihood to be debt-free; ii) presenting evidence that zero leverage is less frequent in bank-based systems; and iii) by presenting a trend of low increase of the zero leverage levels in bank-based financial systems. The results complement the evidence provided by Bessler et al. (2013) that the country factor is determinant in explaining zero leverage.

Finally, Model 6 incorporates all the variables, representing financial constraints, financial flexibility and country specificities, as well as the firm-level and macroeconomic control variables. The results are very similar to those already discussed, and so similar conclusions can be drawn[12].

4.2.2- Zero leverage firms and the dividend payout policy

The analysis presented in this sub-section is motivated by the previous evidence, which suggests the existence of two groups of zero leverage firms according to dividend payout policy. Therefore, the initial sample was divided into two subsamples: one sample composed by firms that pay dividends (generally, presenting characteristics of being financially unconstrained); the other subsample is formed by firms not paying dividends (generally showing characteristics of

[12]Probit regression models were used, and the results are very similar to those already presented and discussed. In addition, in a supplementary analysis, use of the AZL variable as dependent variable substituting ZL does not alter the results of the study qualitatively.

financially constrained firms). Table 9 presents the results of the logistic regression model incorporating all firm-specific, macroeconomic and financial system variables for both samples.

Table 9: Results of the regression for the sub-samples of dividend payers and non-payers

This table presents the results of the regression for the sub-samples formed according to payment of dividends. Column 1 and column 2 present the results for the sub-sample of firms paying dividends and not paying dividends, respectively. The dependent variable has the value of 1 if the firm has no debt in a given year and 0 otherwise. For each independent variable we report the regression coefficients, z-statistics (in parentheses), and the marginal effects (Average Partial Effects). The fixed effects are indicated at the bottom of each column. Robust standard errors are adjusted for heteroscedasticity and clustered by firm. ***,**,* indicates statistical significance at 1%, 5% and 10% respectively

Independent variables	**1 Dividend payers**	**2 Non-dividend payers**
Size	-0.496***	-0.360***
	(-17.97)	(-13.35)
	-0,024	-0,033
Cash holdings	5.154***	3.479***
	(19.77)	(23.62)
	0,252	0,315
Growth opportunities	0.066***	0,019
	(2.61)	(1.55)
	0,003	0,002
Dividend payout	4.454***	
	(7.22)	
	0,217	
Tangibility	-0,434	-1.650***
	(-1.39)	(-5.35)
	-0,021	-0,149
Profitability	1.161***	0,124
	(2.86)	(1.44)
	0,057	0,011
Capital expenditures	-1.938**	-0.257
	(-2.51)	(-0.47)
	-0,095	-0,023
Taxes	1,214	0,908
	(0.71)	(1.32)
	0,059	0,082
Non-debt tax shields	-1,538	-1.797***
	(-1.11)	(-3.10)
	-0,075	-0,163
GDP growth rate	-0.077***	-0.012

	(-5.34)	(-1.07)
	-0,004	-0,001
Financial system	1.181***	0.848***
	(9.95)	(9.66)
	0,058	0,077
Constant	1.843***	0.984***
	(5.06)	(3.25)
Year Dummies	No	No
Industry Dummies	Yes	Yes
Country Dummies	No	No
Observations	42,424	27,071
Wald test	1363.34***	1447.10***
Pseudo R2	0,3145	0,2600
Correct classific.	93.46%	87.02%

The results obtained indicate the existence of different reasons for zero leverage for each group of firms. The impact of the *size* variable in zero leverage presents greater relative magnitude in firms that do not pay dividends than in firms paying dividends. Together with the significant negative effect of the *tangible* assets variable only for the group of firms that do not pay dividends, these results support zero leverage as the result of financial constraints in these group of firms.

As shown by Dang (2013), the financial constraints hypothesis has less strength in the group of debt-free firms that pay dividends. Although firm size presents a negative impact on ZL, the positive and highly significant impact of dividends and the non-significant impact of tangible assets contradict the financial constraints hypothesis. The positive and significant impacts of the cash holdings and of the growth opportunities on the likelihood of ZL are only verified for the group of firms paying dividends. This suggests that the zero leverage occurs by reasons of financial flexibility, probably to assure funding capacity for future investment opportunities. Similarly, to the interpretation of the results of univariate analysis, also here the positive effect of cash holding levels on the likelihood of ZL for non-dividend paying firms suggests that internal finance is fundamental for funding the firms' investments. Thus, zero leverage in this group of firms seems to be associated with firm's dependence on internal finance rather than with the firm's financing decision. The positive effect of profitability on the likelihood of ZL, being only significant for the group of firms paying dividends, supports that these firms present greater levels of profitability.

For both groups of firms with zero leverage, the market-based financial system has a positive impact on firm's likelihood of having zero leverage. Finally, it is noted that *GDP growth rate* has only a negative and statistically significant impact, on the likelihood of dividend-paying firms

having zero leverage[13]. This result is in line with the evidence presented by Dang (2013) and can be explained by the fact that financially unconstrained firms resort to external funding when market conditions are more favourable. Consequently, firms avoid debt in periods of credit contraction, when the lender demands higher interest rates (Dang, 2013).

The results provide evidence that zero leverage is related to the arguments of financial constraints approach, especially for the group of firms that do not pay dividends. The group of dividend-paying firms seems more motivated to present zero leverage as a consequence of firm's financing decisions, seeking to maintain the firm's financial flexibility.

5- Conclusions

This study analyses the zero leverage phenomenon resorting to a sample of European listed firms. Europe is a continent greatly dominated by bank-based financial systems, which makes the study of zero leverage even more challenging. Covering the period of 1995-2016, on average 10.84% of the observations are found to correspond to debt-free firms. This figure is not much lower than that reported in the literature, but it hides the great heterogeneity among countries. The financial system has a great weight in the distribution of debt-free firms, given that, on average, around 16% of the observations recorded in market-based financial systems correspond to debt-free firms. However, only approximately 6% of the observations recorded in bank-based financial systems correspond to zero leverage. The results obtained suggest that zero leverage levels in market-based financial systems present a considerable increase trend. However, in bank-based financial systems, the increase trend is residual and does not even exceed 1p.p. between 1996 and 2016. Therefore, in our sub-sample of European countries with a bank-based financial system, the considerable increase trend of zero leverage levels is not observed.

Seeking to examine whether zero leverage results from frictions and impositions created by the financial market or from financing decisions taken by the firm, the current study considered financial constraints and financial flexibility as possible approaches, for explaining zero leverage of European listed firms. The debt-free firms in Europe are found to be smaller, less profitable and with less tangible assets. Moreover, they display higher levels of cash holdings and growth opportunities and pay more dividends than leveraged firms. More importantly, there are two types of firms that adopt zero leverage: dividend-paying firms and non-dividend paying firms. The debt-free firms paying dividends are found to be more profitable. Moreover, the firms paying higher dividends present greater levels of cash holdings and growth opportunities than leveraged firms.

[13]The use of *crisis dummy* variable instead of the *GDP growth rate* shows that the crisis period has a positive and significant effect on ZL for both group of debt-free firms.

On the contrary, debt-free firms that do not pay dividends are smaller, with lower level of tangible assets and present lower levels of profitability. The reasons for zero leverage differ between the two groups of firms: i) the group formed by dividend-paying firms emerge as being in good financial health, highly profitable and provide signals of adopting conservative levels of debt through their own financing decisions, supporting the financial flexibility approach; ii) while, the group of firms that do not pay dividends present a weaker financial situation, indicating that their zero leverage is essentially explained by the difficulties in obtaining debt, which is in accordance with explanations of the financial constraints approach. In general, the results allow to conclude that European listed firms with zero leverage are mostly financially constrained.

This study presents implications for the scientific community concerned with the topic of zero leverage as well as conservative levels of debt in general. Firstly, we show that the financial system plays a determinant role on zero leverage phenomenon. Secondly, we show that the financial and sovereign debt crises potentiated firm's zero leverage. Finally, we show that there are two types of firms with zero leverage. Summarising, the results of the current study indicate that no single approach is able to explain the zero leverage phenomenon. In fact, zero leverage in European firms seems to be related to the considerations of financial flexibility and financial constraints approaches as well as to specific effects of the country and macroeconomic conditions.

For practitioners/managers and government entities, this paper contributes by showing the existence of a rather unusual capital structure in Europe, namely in bank-based financial systems. In particular, we present the characteristics of debt-free firms as well as the temporal and spatial conditions that potentiate the occurrence of the phenomenon. The evidences obtained in this study, about an extremely conservative capital structure, should be further explored to possibly alert managers to reduce dependency on the bank and governments to create conditions enabling that, which could result in a reduction of the risk default. Additional future research should consider other explanatory approaches that could be fundamental in explaining zero leverage. The corporate governance approach to analyse zero leverage of European firms would be welcome. Furthermore, we suggest for future research the comparison of the performance between debt-free firms and leveraged firms. Finally, we suggest to analyse and compare the target debt ratio between debt-free firms and leveraged firms.

Appendix A

Table A1: Characteristics of debt-free firms separated by different levels of constraints

This table compares the mean of the characteristics of debt-free firms with different levels of constraints, using the SA-index to separate the sample in constrained ZL and unconstrained ZL, with the total of leveraged firms. Firms are divided into quintiles according to the score determined in the following index:

SA-index = (– 0.737 * Size) + (0.043 * Size^2) – (0.040 * Age), where size is the logarithm of total assets and age is the number of years in which the firm appears in the Datastream database without missing data for the market value. Finally, t-tests are presented for the differences between the means.
* significance at 10%, ** significance at 5% and *** significance at the 1% level.

Variables	**ZL unconstrained (1)**	**ZL constrained (2)**	**Leveraged firms (3)**	**T-test for diff. in means (1) vs (2)**	**T-test for diff. in means (1) vs (3)**	**T-test for diff. in means (2) vs (3)**
Size	11.684	9.525	11.843	43.568***	-2.457**	-80.109***
Cash holdings	0.305	0.343	0.129	-4.838***	39.694***	120.000***
Growth opportunities	2.670	2.288	1.316	3.840***	26.333***	42.698***
Tangibility	0.190	0.129	0.261	10.528***	-10.674***	-44.361***
Profitability	0.102	-0.016	0.079	9.508***	3.796***	-32.032***
Capital expenditures	0.055	0.036	0.056	9.534***	-0.199	-20.512***
Dividend Payout	0.038	0.027	0.017	4.919***	19.346***	20.742***
Taxes	0.028	0.014	0.016	7.876***	13.324***	-2.826***
Non-debt tax shields	0.048	0.043	0.050	2.362**	-1.910*	-10.753***
Observations	1,160	5,931	78,769			

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